



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

2 MAY 1996

FROM: HQ AFCESA/CES  
139 Barnes Drive  
Tyndall AFB FL 32403-5319

SUBJECT: **Engineering Technical Letter (ETL) 96-2: Elimination of Liquid Polychlorinated Biphenyls (PCBs) Prioritization Guidance**

**1. Purpose.** This ETL provides guidance to help the Base Civil Engineer (BCE) and other users prioritize replacement projects for real property installed equipment containing liquid PCBs. A prioritization model is provided based on environmental risk factors and best business practices to help in project validation and competition for available pollution prevention funds.

**2. Application.**

**2.1. Authority.** This ETL complies with the Air Force Civil Engineer memorandum of 27 Nov 1995, Elimination of Liquid Polychlorinated Biphenyls (PCBs); HQ USAF/CEV memorandum of 27 Feb 1996, Polychlorinated Biphenyl (PCB) Pollution Prevention Program; AFI 32-7001, *Environmental Budgeting*; and AFI 32-1064, *Electrical Safe Practices*. It is consistent with AFI 32-7080, *Air Force Pollution Prevention Program*.

**2.2. Effective Date:** Immediately. Expires five years from date of issue.

**3. Referenced Publications.**

**3.1.** 40 CFR 761, *Toxic Substances Control Act*.

**3.2.** AFJMAN 32-1080, *Electrical Power Supply and Distribution*.

**3.3.** AFJMAN 32-1082, *Facilities Engineering Electrical Exterior Facilities* (issue pending)

**4. Specific Requirements.**

**4.1.** The Air Force Civil Engineer has established 31 Dec 1998 as the new target date for the Air Force to be PCB-free. PCB items targeted by this pollution prevention program includes real property installed equipment containing liquid PCBs in concentrations of 50 parts per million (ppm) or greater that are not specifically exempted from regulation under the Toxic Substances Control Act (TSCA) regulations at 40 CFR 761. For example, PCB small capacitors and

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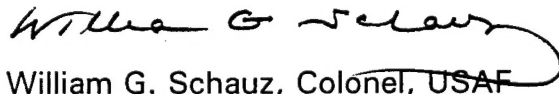
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fluorescent light ballasts are not targeted for elimination under this program because they are exempted from regulation under 40 CFR 761.

**4.2.** HQ USAF/CEV memorandum of 27 Feb 1996 states that pollution prevention funds may be used for removal and replacement of PCB equipment which is not otherwise eligible for real property maintenance or environmental compliance funds. This includes projects that eliminate PCB items that are in compliance with 40 CFR 761 and are not projected for replacement prior to December 1998 to meet service life, serviceability, or upgrade requirements. Those PCB items that are out of compliance with 40 CFR 761 regulations should be removed, retrofilled, or replaced as Level 1 environmental compliance projects. Those PCB items projected for replacement solely to meet service life, serviceability, or upgrade requirements should be replaced using real property maintenance funds.

**4.3.** A model is provided (Attachment 1) to prioritize your PCB elimination projects that are eligible for the pollution prevention program and for use in validating projects to MAJCOM and Air Staff program managers for pollution prevention funding.

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Director of Technical Support

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1. Pollution Prevention Project  
Prioritization Model for Liquid  
PCB Elimination
2. Distribution List

## Pollution Prevention Project Prioritization Model for Liquid PCB Elimination

**Application of this Model.** Assign values of 1, 5, 10, or 100 to each of the five factors listed below for each PCB item (liquid PCB items only) on your installation or Government-Owned/Contractor-Operated (GOCO) facility based on the individual factor descriptions. The product of the five factor values assigned to any PCB item may be used in prioritization of the item for removal or replacement including PCB incineration<sup>1</sup> under the Air Force pollution prevention program element. Note that funding priority is not determined by the prioritization model. An example of a spreadsheet to record the assigned values is provided in Figure 1.

**Factor 1, PCB Level (PL).** PCB level refers to the concentration and type of fill fluid contained in the PCB item. Top priority is given to the removal of items with pure PCB fluid such as Askarel, items with a high concentration of PCBs, and Askarel units that have been retrofilled.<sup>2,3</sup> Table 2 provides a list of common trade names for PCB dielectric fluids.

- 1 = Mineral oil units, 0 - 49 parts per million PCB
- 5 = Mineral oil units, 50 - 499 parts per million PCB
- 10 = Mineral oil units, 500 - 5000 parts per million PCB
- 100 = Mineral oil units, greater than 5000 parts per million PCB; or, Askarel units; or, Askarel units that have been retrofilled (any concentration of PCBs in dielectric fluid)

**Factor 2, Transformer Loading (TL).** Transformer loading refers to the average daily loading<sup>4</sup> as a percent of nameplate capacity of transformers in service to provide electrical power. Priority is given to transformers with high loading because this condition

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<sup>1</sup> PCB elimination projects should dispose of PCBs and PCB-contaminated wastes by incineration in an EPA approved facility. For transformer carcasses and similar components, the term incineration as used here means the complete destruction of PCBs with recycling of reusable metals. Components of PCB items shall be cleaned so that residual PCB levels are less than 10 micrograms per 100 square centimeters.

<sup>2</sup> In the case of units manufactured with mineral oil fill and having PCB contamination of 5000 parts per million or less, retrofit may be considered as an alternative to removal or replacement with total destruction by incineration. Because of the tendency of PCBs to leach out of transformer parts and surfaces into replacement dielectric fluids, units originally filled with Askarel fluid should not be retrofilled, regardless of current PCB concentration. Units in poor or marginal condition, as discussed under Factor 3, should be removed and replaced rather than retrofilled. Additionally, pole-mounted transformers should be removed and replaced rather than retrofilled.

<sup>3</sup> Removal of retrofilled Askarel items is given equal priority because: (a) of their greater susceptibility to leaks; and (b) leaks result in the release of both PCBs and perchloroethylene [used as a cleaning agent and replacement dielectric fluid for Askarel in the retrofitting process and subject to strict controls for exposure by Occupational Safety and Health Act (OSHA), and for disposal under the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act (TSCA)].

<sup>4</sup> Average daily loading may be adjusted for areas with high ambient temperatures as discussed in AFJMAN 32-1080, Electrical Power Supply and Distribution (see Chapter 8).

shortens service life and increases risk of PCB releases.<sup>5</sup> Transformers in storage for reuse and other PCB items are assigned values as indicated.

- 1 = Electrical equipment (transformers, capacitors) in storage for reuse and non-electrical PCB items
- 5 = Electrical equipment (transformers, capacitors) in service
- 10 = Transformers in service loaded greater than 95 percent

**Factor 3, Condition (C).** Condition refers to the state of its physical structure, its ability to perform the function(s) for which it is intended, and the remaining period of the service life based on the date of manufacture. Normal service life is defined for the purposes of this model as 30 years for Askarel or retrofilled Askarel items, and 20 years for mineral oil filled items.<sup>6</sup>

- 1 = Good condition, fully serviceable, and manufactured age less than 16 years for mineral oil items, or less than 24 years for Askarel or retrofilled Askarel items
- 5 = Marginal condition, limited serviceability, or manufactured age 16-20 years for mineral oil items or 24-30 years for Askarel or retrofilled Askarel items
- 10 = Poor condition or manufactured age over 20 years for mineral oil items or over 30 years for Askarel or retrofilled Askarel items

**Factor 4, Mission Impact (MI).** This factor represents the mission impact on a facility or the reduction/hindrance of normal use of a facility. It provides an estimate of the impact on the mission or readiness of an installation resulting from a mishap involving PCBs. Such a mishap could result in PCB contamination of the facility, and partial or total loss of the facility or of the functions performed in or by the facility.

- 1 = Negligible. Facility not affected; or partial or total loss of the facility or its functions would not jeopardize the mission or reduce readiness
- 10 = Moderate. Partial or total loss of the facility or its functions would hinder mission accomplishment, cause "work arounds", reduce readiness, or cause short-term delays in production or delivery of products
- 100 = Critical. Partial or total loss of the facility or its functions would prevent mission accomplishment to the extent that long-term alternative sources of products or services would be needed to regain and sustain readiness

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<sup>5</sup> Transformers with low loading, especially older transformers, are very inefficient and waste significant amounts of electrical power. Replacement of transformers with low loading will provide a faster payback than replacement of transformers with higher loading, all other factors being equal.

<sup>6</sup> To achieve normal service life, a transformer should have had oil testing on an annual basis (see AFJMAN 32-1082, *Facilities Engineering Electrical Exterior Facilities*). Oil reclamation should have been performed on the transformer when this testing showed oil decay products. If this has not been done, the transformer should be considered in poor condition.

**Factor 5, Environmental Risk (ER).** Environmental risk incorporates environmental impact considerations in the PCB elimination decision making model. Potential for direct or indirect PCB contamination of water sources and waterways, food and feed, and proximity to sensitive receptors such as residential areas, public and commercial buildings, and wetlands or other sensitive habitats are reflected in this factor. For PCB items installed indoors, facility features to control ventilation and limit contamination to a vault or limited maintenance area are also considered.

- 1 = Negligible risk. Item meets all the following criteria:
  - a. Groundwater - Greater than 1.5 meters (5 feet) to groundwater through soils, or no groundwater, or impermeable surface which protects groundwater; and
  - b. Surface water - Greater than 30 meters (100 feet) to storm drains/floor drains connected to storm water system or surface water; and
  - c. Sensitive receptors - Greater than 150 meters (500 feet) to residential areas, farm land, on-base or off-base public/commercial buildings, wetlands or other sensitive environmental receptors; and
  - d. Facility containment (indoor items) - Facility features control ventilation and limit contamination to transformer vault or similar enclosed space less than 280 square meters (3000 square feet); and
  - e. Flood Plain - Item not located within the 100-year flood plain.
- 10 = Moderate risk. Item doesn't meet the criteria for negligible risk, but meets all the following criteria:
  - a. Groundwater - Greater than 0.3 meters (1 foot) to groundwater with no impermeable surface; and
  - b. Surface water - Greater than 3 meters (10 feet) to storm drains/floor drains which are connected to storm water system or surface water; and
  - c. Sensitive receptors - Greater than 30 meters (100 feet) to residential areas, farm land, on-base or off-base public/commercial buildings, wetlands or other sensitive environmental receptors; and
  - d. Facility containment (indoor items) - Facility features control ventilation and limit contamination to a single room or building level less than 1400 square meters (15,000 square feet); and
  - e. Flood Plain - Item not located within the 100-year flood plain.
- 100 = High Risk. Item doesn't meet the criteria for moderate risk, or meets one or more of the following criteria:
  - a. Groundwater - Within 0.3 meters (1 foot) of groundwater with no impermeable surface; or
  - b. Surface water - Within 3 meters (10 feet) of storm drains/floor drains which are connected to a storm water system or surface water; or
  - c. Sensitive receptors - Within 30 meters (100 feet) of residential areas, farm land, on-base or off-base public/commercial buildings, wetlands or other sensitive environmental receptors; or

- d. Facility containment (indoor items) - Facility features do not control ventilation or PCB contamination could spread to an indoor area 1,400 square meters (15,000 square feet) or greater; or
- e. Flood Plain - Item located within the 100-year flood plain.

[illegible]

Figure 1. Example of Prioritization Spreadsheet

**Table 1. Common Trade Names For Dielectric Fluids Containing PCBs**

Chlorphen	Eucarel	Inerteen (US & Canada)	Pydraul (US)
ALC	Clorinol	Kanechlor (Japan)	Pyralene (France)
Apirolio (Italy)	Diaclor	Keneclor	Pyranol (US & Canada)
Aroclor (US & UK)	DK (Italy)	Kennechor	Pyroclor (UK)
Aroclor B	Dykanol	Magvar	Saf-T-Kuhl
Asbestol	EEC-18	MCS 1489	Santotherm
ASK	Elemex	Montar (US)	Santotherm FR (Japan)
Askarel	Clophen (Germany)	Nepolin	Santovac 1 and 2
Adkarel	Fenclor (Italy)	No-Flamol	Solvol
Capacitor 21	Hyvol	Nonflammable Liquid	Sorol (USSR)
Chlorextol	Inclor	Phenoclor (France)	Therminol FR (US)
Chlorinol			

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